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Plant
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24507
PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF
LIMITED DISTRIBUTION

- NO. 42: BEAN FLY (Ophiomyia phaseoli)
NO. 43: OLIVE FRUIT FLY (Dacus oleae)
NO. 44: BLACK PARLATORIA SCALE (Parlatoria ziziphi)
NO. 45: ARROWHEAD SCALE (Unaspis yanonensis)
NO. 46: PINK-SPOTTED BOLLWORM (Pectinophora scutigera)
NO. 47: LARGE WHITE BUTTERFLY (Pieris brassicae)
NO. 48: FALSE CODLING MOTH (Cryptophlebia leucotreta)
NO. 49: PLUM FRUIT MOTH (Cydia funebrana)
NO. 50: LIGHT-BROWN APPLE MOTH (Epiphyas postvittana)
NO. 51: CABBAGE THRIPS (Thrips angusticeps)
NO. 52: MAIZE STREAK VIRUS
NO. 53: WHEAT YELLOW SLIME (Clavibacter tritici)
NO. 54: RICE BACTERIAL LEAF BLIGHT (Xanthomonas campestris
pv. oryzae)
NO. 55: BROWN STRIPE DOWNY MILDEW (Sclerophthora rayssiae var.
zeae)
NO. 56: SOYBEAN RUST (Phakopsora pachyrhizi)
NO. 57: CHRYSANTHEMUM WHITE RUST (Puccinia horiana)
NO. 58: KARNAL BUNT (Tilletia indica)
NO. 59: RICE STEM NEMATODE (Ditylenchus angustus)

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Preface

Many of our serious pests were introduced into the United States. They escaped detection, became established, and multiplied in the new and favorable environment. The damaging potential of such pests is often considerable. Mediterranean fruit fly, large crabgrass, and the pathogen of Dutch elm disease are some examples. When new plant pests are detected, early management can minimize potential destruction and loss. Therefore, early detection and timely notification is essential to the control of a new plant pest.

"Pests Not Known to Occur in the United States or of Limited Distribution (PNKTO)" are designed to facilitate that objective. The material is presented to aid in detecting plant pests new to the United States and evolving plant pest management strategies against the pest. Detecting a new plant pest requires that an individual spot differences unusual to the species or the infestation. Illustrations, written descriptions, and detection notes in the PNKTO are provided to aid detection. After a plant pest is detected and identified as new to the United States, strategies to deal with the pest must be developed. The biological data, current distribution, and economic potential in the PNKTO are provided to aid agricultural workers in designing an effective program. When more data are needed, the literature references are a means of locating more information.

The Animal and Plant Health Inspection Service, Plant Protection and Quarantine, is responsible for eradicating, suppressing, controlling, and preventing or retarding the spread of new plant pests. Please telephone Area Code (301) 436-7472 and report to us any plant pests you believe may be new to the United States. New is defined as those organisms introduced into the United States from foreign countries or into the contiguous 48 States from Alaska, Hawaii, or the territories.

Be alert to the different or unusual infestation of insects, pathogens, or other pests. Collect and submit for identification specimens suspected of being new to the United States, and report any new detections to us.

PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF LIMITED
DISTRIBUTION, NO. 42: BEAN FLY

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20782

Pest

BEAN FLY
Ophiomyia phaseoli (Tryon)

Selected

Oscinis phaseoli Tryon, 1895

Synonyms

Agromyza phaseoli Coquillett, 1899

Agromyza fabalis Jack, 1913

Agromyza destructor Malloch, 1916

Melanagromyza phaseoli Vanschuytbroeck, 1951a

Synonymy by Singh and Ipe, 1973: 58, but needs confirmation.

Melanagromyza similis Vanschuytbroeck, 1951b

Synonymy by Singh and Ipe, 1973: 58, but needs confirmation.

Melanagromyza phaseoli (Tryon) Spencer, 1959

Ophiomyia phaseoli (Tryon) Spencer, 1973b

Order: Family

Diptera: Agromyzidae

Economic
Importance

The bean fly causes severe damage to leguminous crops in the tropical and subtropical regions (Avidov and Harpaz 1969). Oviposition injury to the leaf tissue is of no economic importance, but larval damage is usually very extensive (Spencer 1973a). In Australia, the bean fly restricts the bean-growing season to the cooler months, and even then, serious losses occur if the winter is mild (Taylor 1958). This species is especially serious on late-planted beans in Egypt, where up to 100 percent seedling loss has been recorded (Hammad 1978). In India, this species is the most destructive pest of soybeans, attacking from 15 to 46 percent of the plants in winter and early spring and up to 96 percent of the plants in summer and fall (Jagtap, Awate, and Naik 1979). Under optimum conditions for this pest in Thailand, damage can be very severe and involve a 90 percent mortality of the seedlings (Arunia 1978).

Hosts

O. phaseoli is a serious pest of a wide variety of leguminous crops, mainly species of Phaseolus. Bean fly has been recorded on the following hosts: Cajanus cajan (pigeon pea), Canavalia ensiformis (jackbean), Crotalaria juncea (sunn hemp), Crotalaria pallida (smooth crotalaria), Dolichos lablab (hyacinth bean), Glycine max (soybean), G. soja, Macroptilium atropurpureum (siratro), Macroptilium heterophyllum, Macroptilium lathyroides, Macrotyloma uniflorum (horse gram), Phaseolus acutifolius (teparty bean), P. lunatus (lima bean), P. vulgaris (haricot bean, kidney bean), Vigna aconitifolia

(moth bean), V. mungo (black gram), V. radiata (green gram, mung bean), and V. unguiculata (asparagus bean, catjang, cowpea, yard-long bean) (Arunin 1978, Khamala 1978, Rose, Chiang, and Harnoto 1978, Saxena 1978, Spencer 1973a, Srivastava and Singh 1976, Taylor 1958). Solanum sp. (nightshade) has been reported as a host (Paddock 1977).

General
Distribution

O. phaseoli is found chiefly in the tropical region of the Old World. It also occurs in the subtropics including some of the Mediterranean countries (Avidov and Harpaz 1969).

This species is known in Hawaii from all the main islands (Hardy and Delfinado 1980). Elsewhere, Commonwealth Institute of Entomology (1974) listed the following distribution unless cited otherwise: ASIA - Bangladesh, Burma, China, Gaza, Hong Kong, India, Indonesia, Iraq, Israel, Japan (only Ryukyu Islands), Jordan, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and Vietnam (Singh and Ipe 1973); AFRICA - Burundi, Egypt, Ethiopia, Kenya, Madagascar, Malawi, Mali, Mauritius, Nigeria, Reunion, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, Zaire, Zambia, and Zimbabwe; and AUSTRALIA AND PACIFIC ISLANDS - Australia, Caroline Islands, Fiji, Marianas Islands, Papua New Guinea, and Western Samoa.

Characters

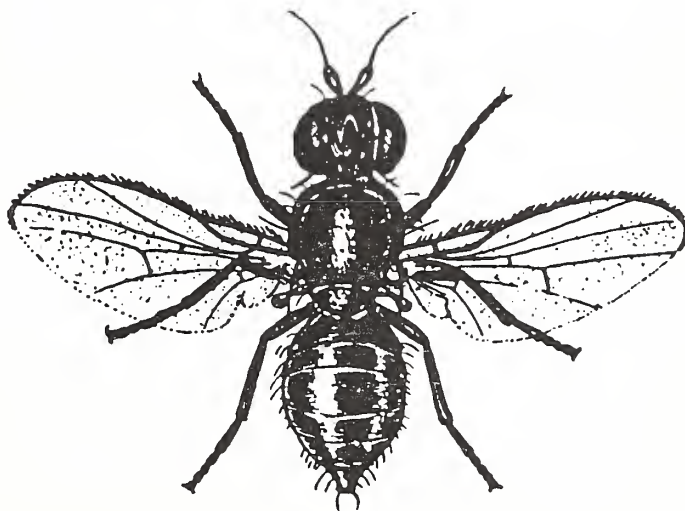
ADULTS (Fig. 1) - Length about 2.5 mm. Head (Fig. 2A) with frons narrow, not as wide as eye. Two pairs each of inferior and superior fronto-orbital bristles, latter slightly stronger. Arista microscopically pubescent. Gena rather broad, rounded, about one-seventh as high as eye. Mesonotum and abdomen metallic black; squama pale whitish grey, margin and fringe black. Wing (Fig. 2B) 1.8-2.2 mm long, penultimate section of vein M 1+2 two-thirds to three-fourths as long as m crossvein and nearly three times longer than r-m. Male aedeagus (Figs. 2C and D); ninth sternite triangular, short extension at end; surstyli rounded, bearing some weak bristles (Hardy and Delfinado 1980, Spencer 1973a).

The following characters separate Ophiomyia from the more primitive internal stem-boring genus Melanagromyza: Vibrissal fasciculus normally present in male; antennal base normally divided by raised facial keel; in male genitalia, basiphallus with elongate sidearms and distiphallus asymmetrical; posterior spiracles of larva on raised stalks; puparium sometimes black; larva feeds as leafminer or external stem miner (Spencer 1973a).



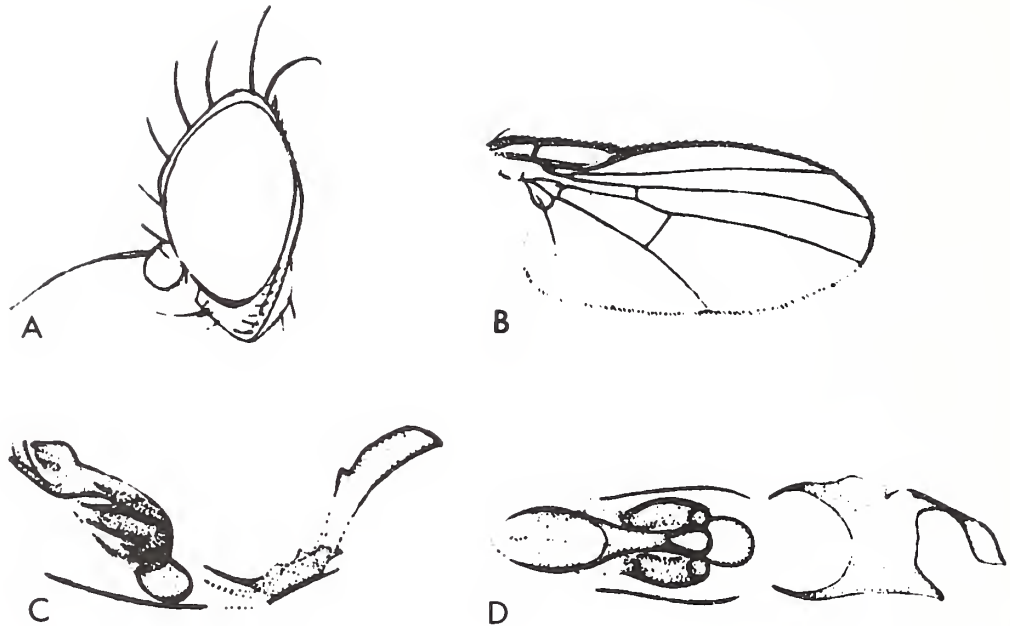
Ophiomyia phaseoli distribution map prepared by Non-Regional Administrative Operations Office and Biological Assessment Support Staff, PPQ, APHIS, USDA

(Fig. 1)



Ophiomyia phaseoli adult female, dorsal view (From Taylor 1958).

(Fig. 2)



Ophiomyia phaseoli adult: A. Head, lateral view. B. Wing. C. Aedeagus, lateral view. D. Aedeagus, ventral view (From Spencer 1973a).

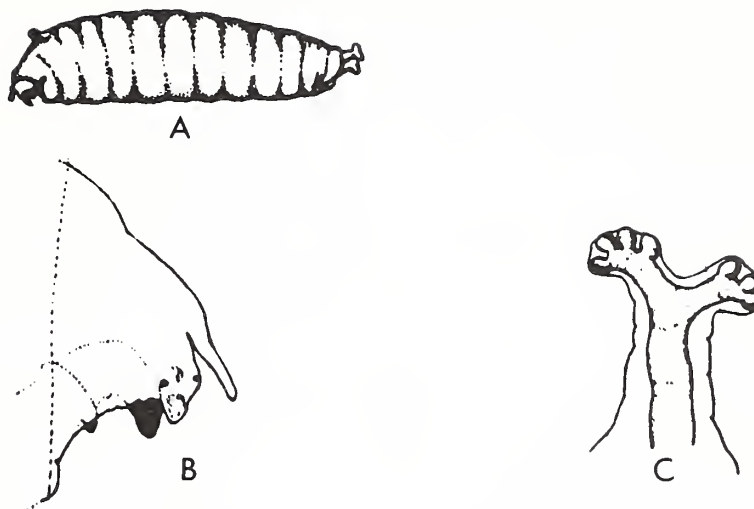
O. phaseoli is differentiated from other Ophiomyia by the large, elongate polished black ocellar triangle, which extends almost the full length of the frons. The male aedeagus is also distinctive (Hardy and Delfinado 1980).

EGGS - White, oval, 0.39 mm by 0.17 mm.

LARVAE (Fig. 3A) - Creamy white (Paddock 1977). Slender, full-grown length 4.25 mm; mouth hooks paired, left mouth hook large, with one large but relatively short and two minute teeth, right mouth hook half height of left and just visible in side view, long fingerlike process above mouth hooks (Fig. 3B); cephalo-pharyngeal skeleton black at front, paler behind; anterior spiracles small with circle of 6 minute bulbs; posterior spiracles (Fig. 3C) closely adjoin on conical projections, with normally about 10 bulbs (Spencer 1973a).

PUPAE - Yellow to brown, 3-3.5 mm long and 2.2 mm broad, barrel-shaped with well-defined segments (Paddock 1977).

(Fig. 3)



Ophiomyia phaseoli larva: A. Body, lateral view. B. Head, lateral view. C. Posterior spiracles, ventral view (From Spencer 1973a).

Characteristic
Damage

Young legume plants are most susceptible. Infested seedlings are recognized by the yellowing and wilting of the first two leaves, frequently followed by the collapse of the plant at or near ground level. Stems surviving the initial attack rupture where the larvae and pupae are clustered, usually near ground level, and develop large callous areas (Fig. 4).

Larvae remaining in the leaf stalks and axils of the older plants produce swollen, discolored, and sometimes callous areas. The leaves show numerous punctures (Paddock 1977, Spencer 1973a, Taylor 1958).

Detection
Notes

O. phaseoli may enter a country inside the stalks, leaves, or roots of its hosts. Although these parts are usually not imported, host plants are generally enterable into the United States subject to inspection. PPQ would require quarantine action under the Federal Plant Pest Act if these hosts were infested with this pest or with agromyzids that cannot be identified to species and thus, may be exotic.

There was no record of interceptions at U.S. ports of entry in the last 13 years.

This species may be detected in the following ways.

1. Survey in spring, summer, or fall whenever young bean plants are available.

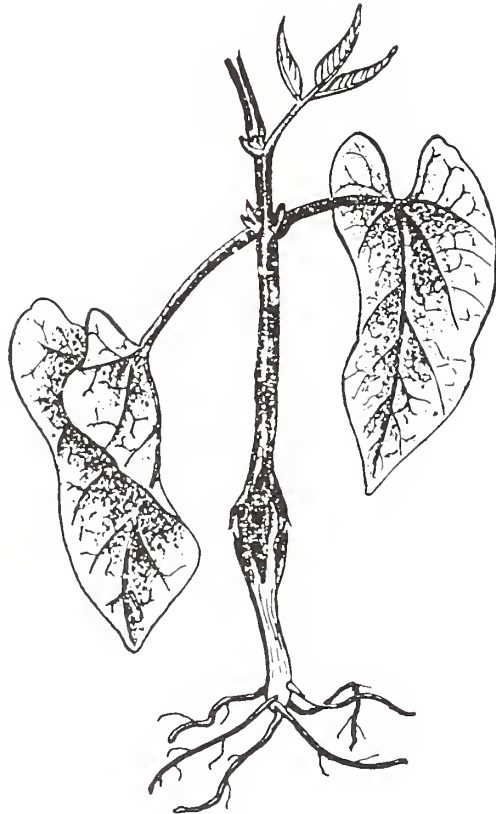
2. Inspect for yellowing and drooping leaves.

3. Watch for swollen or split stems and rusty red callous areas on the stem at the juncture of the stem and ground, or a little above or below the ground. Cut suspect stems and carefully examine for larvae, pupae, or empty pupal cases.

4. Watch for adult flies on or about the foliage.

5. Collect and submit for identification any suspicious-looking specimens. Larvae should be boiled in water and preserved in 70 percent alcohol (Paddock 1977).

(Fig. 4)



Ophiomyia phaseoli damage to bean plant showing stem injury near ground level (From Taylor 1958).

Biology

In a study in India, adults mate soon after emergence. The female wanders over the surface of the leaves to locate a suitable spot for oviposition and inserts her ovipositor vertically into the leaf. After each insertion, she moves backwards and sucks the sap oozing from the wound. Manohar and

Balasubramanian (1980) observed eggs laid mostly in the lower surface of the leaves, but Greathead (1969) observed that the female prefers the upper surface.

In Zimbabwe, oviposition takes place in young leaves, either on the upper or lower surface. A female lays between 100 and 300 eggs over 2 weeks. Punctures may be very numerous but only small numbers contain eggs. The eggs hatch in 2-4 days. The larvae mine the leaf for about 2 days and then, entering the nearest vein, bore into the petiole and down the stem. In young plants the main feeding takes place in the lower cortical layers of the stem, but some larvae penetrate the tap root. In a heavy infestation, the larvae feed deeper inside the stem and also higher up the plant. The larval stage takes about 10 days in the summer. In seedlings the larvae pupate below the epidermis of the stem at or immediately above soil level, while in older plants they pupate at the base of the petioles. The pupal stage takes 9-10 days.

The complete life cycle takes about 3 weeks in warm weather. As the temperature drops, the life cycle takes longer, and by early spring is extended to 5-6 weeks. In Egypt, the life cycle can be completed in 17 days under optimum conditions. At higher altitudes in Java, Indonesia, the larval stage can last 17-22 days and the pupal stage 13-20 days (Spencer 1973a, Taylor 1958, Taylor 1980).

The fly in Israel produces several generations a year with the main reproductive activity in late summer and fall (Avidov and Harpaz 1969).

Control

Avoid continuous planting of crops of beans. Destroy crop residues and volunteer plants after one bean crop is harvested and before the next is planted (Hill 1983).

Literature Cited

Arunin, A. Pests of soybean and their control in Thailand. p. 43. In: Pests of grain legumes: ecology and control. New York: Academic Press; 1978.

Avidov, Z.; Harpaz, I. Melanagromyza (=Agromyza) phaseoli Coquillett. p. 431. In: Plant pests of Israel. Jerusalem: Israel Universities Press; 1969.

Commonwealth Institute of Entomology. Distribution maps of insect pests. Ser. A, No. 130 (Revision). London, England: Commonwealth Institute of Entomology; 1974.

- Coquillett, D. W. Description of Agromyza phaseoli, a new species of leaf-mining fly. Proc. Linn. Soc. N.S.W. 24:128; 1899.
- Greathead, D. J. A study in East Africa of the bean flies (Dipt., Agromyzidae) affecting Phaseolus vulgaris and of their natural enemies, with the description of a new species of Melanagromyza Hend. Bull. Entomol. Res. 59(3): 541-561; 1969.
- Hammad, S. M. Pests of grain legumes and their control in Egypt. p. 135. In: Pests of grain legumes: ecology and control. New York: Academic Press; 1978.
- Hardy, D. E.; Delfinado M. D. Agromyzidae. Insects of Hawaii 13:195-203; 1980.
- Hill, D. S. Ophiomyia phaseoli (Tryon) (= Melanagromyza p. (Tryon)). p. 78, 329, 519, 559, 583, 620, 655. In: Agricultural insect pests of the tropics and their control. 2d ed. New York: Cambridge University Press; 1983.
- Jack, R. W. The bean stem maggot. Rhodesia Agric. J. 10:545-553; 1913.
- Jagtap, A. B.; Awate, B. G.; Naik, L. M. Chemical control of stem fly Ophiomyia phaseoli Tryon (Agromyzidae-Diptera) infesting french-bean (Phaseolus vulgaris Linn.) in Maharashtra. J. Maharashtra Agric. Univ. 4(1):83-84; 1979.
- Khamala, C. P. M. Pests of grain legumes and their control in Kenya. p. 128. In: Pests of grain legumes: ecology and control. New York: Academic Press; 1978.
- Malloch, J. R. A new species of Agromyzid destructive to beans in the Philippines. Proc. Entomol. Soc. WA 18:93; 1916.
- Manohar, S.; Balasubramanian, M. Note on the oviposition behaviour of agromyzid stem fly Ophiomyia phaseoli Tryon (Diptera: Agromyzidae) in blackgram. Madras Agric. J. 67(7):470-471; 1980.
- Paddock, E. L. Bean fly, Ophiomyia phaseoli (Tryon). Detection manual (Revision). D.T. 3:57. California Department of Food and Agriculture, Division of Plant Industry, Exclusion and Detection; 1977.

- Rose, R. I.; Chiang, H. S.; Harnoto, I. Pests of grain legumes and their control in Taiwan. p. 67. In: Pests of grain legumes: ecology and control. New York: Academic Press; 1978.
- Saxena, H. P. Pests of grain legumes and their control in India. p. 16. In: Pests of grain legumes: ecology and control. New York: Academic Press; 1978.
- Singh, S.; Ipe, I. M. Melangromyza phaseoli (Tryon). p. 58-59. In: The Agromyzidae from India. Memoirs School Entomol. India: St. John's College, Agra-2. No. 1; 1973.
- Spencer, K. A. A synopsis of the Ethiopian Agromyzidae (Diptera). Trans. R. Entomol. Soc. London 111:237-329; 1959.
- _____. Ophiomyia phaseoli (Tryon). p. 61-68. In: Agromyzidae (Diptera) of economic importance. W. Junk Publishers. The Hague; 1973a.
- _____. Some Agromyzidae (Diptera) from the Maltese Islands. Entomol. Mon. Mag. 108(1972):190-192; 1973b.
- Srivastava, K. M.; Singh, L. N. A review of the pest complex of kharif pulses in Uttar Pradesh. Pans 22(3);333-335; 1976.
- Taylor, C. E. The bean stem maggot. Rhodesia Agric. J. 55(6):634-635; 1958.
- Taylor, D. E. Bean-stem maggot. Zimbabwe Agric. J. 77(5):213; 1980.
- Tryon, H. The bean maggot. Trans. Nat. Hist. Soc. Qd. 1:4-7; 1895.
- Vanschuytbroeck, P. Description d'un diptère Agromyzidae nouveau du Congo belge. Rev. Zool. Bot. Afr. 44(2):167-168; 1951a.
- _____. Rectification de nomenclature. Rev. Zool. Bot. Afr. 45(1-2):99; 1951b.

